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OF THE

ESSEX FIELD CLUB,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

Honorary Secretary and Curator.

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The Authors alone are responsible for the statements and opinions contained in their respective papers.

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The Recording and Preservation of examples of the Folk-Songs and Dialect of East Anglia and Essex.

The statement on the wrapper of the July part of the ESSEX NATURALIST has aroused considerable attention, and I have received promises of help. Some experienced musicians and experimenters have also given valuable advice. Local societies have been induced to take up the subject, and I am hopeful that an important East Anglian organisation will actively co-operate in our own district.

A few experiments carried on during last autumn fully demonstrated the practicability of recording accurately local songs and dialect "pieces" by the phonograph, and we anticipate making substantial progress during the ensuing summer and autumn.

As an exemplification of the danger of delay, I regret to mention that an old Essex yeoman in a village on the Colne, from whom we took "records" of two or three "Ballets" and "Horkeys" in the autumn, has just died, and with him expires, probably, our chance of obtaining material, in his parish. If the work is not done during the present generation of old folk it will be too late. It will daily become more difficult to save from oblivion the old carols, hunting songs, rent-dinner songs, fair-day songs, sheep-shearing songs, horkey songs and country dances, which delighted our forefathers. They are dying out with our peasantry, and with them the wealth of music transmitted to us from our Norse and Danish ancestors, as well as from Flemish, Dutch, and French sources, will perish—a great loss to students of folk-lore and dialect, and a reproach to East Anglians for ever.

I hope to be in a position to announce details of the proposed Committee and its work in the near future.

WILLIAM COLE,
Member of the Folk-Song Society.

THE ESSEX MUSEUM OF NAT. HIST.,
ROMFORD ROAD,
STRATFORD, ESSEX.

May, 1907.

ON A RECENT SUBSIDENCE AT MUCKING, ESSEX.

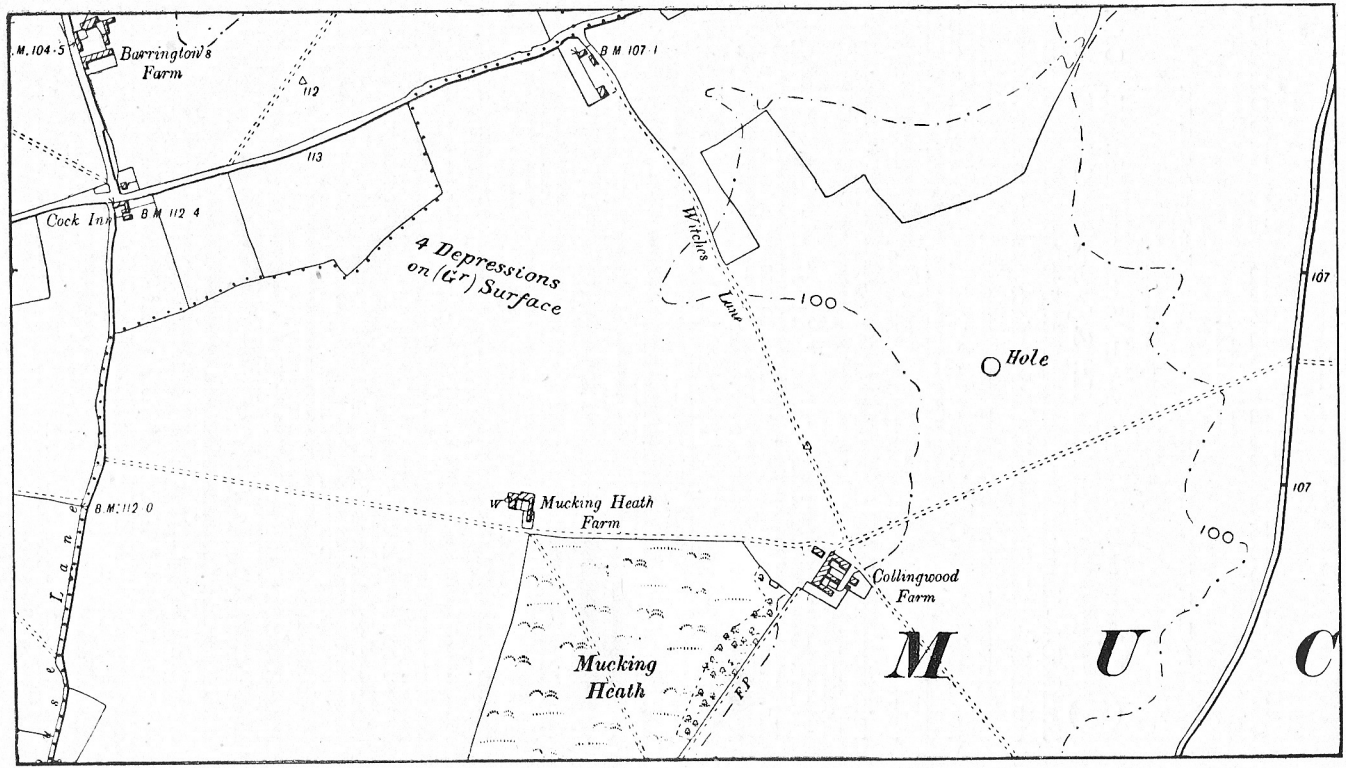
By T. V. HOLMES, F.G.S., *F.Anthrop.Inst.*, *Vice-President*, *E.F.C.*

[*Read February 24th*, 1906.]

ON January 12th (1906), our Secretary, Mr. W. Cole, received a letter from Mr. S. J. Squier, of the Rookery, Stanford-le-Hope, Essex, stating that "in the middle of one of our fields in Mucking parish, the surface has dropped in, leaving a big circular hole like a great well, measuring 25 feet across and 20 feet in depth." Mr. Squier added that in the fields near appeared, in a line, hollows suggesting the former existence there of similar holes, though he could not find anyone in the neighbourhood who remembered the occurrence of anything of the kind in past years.

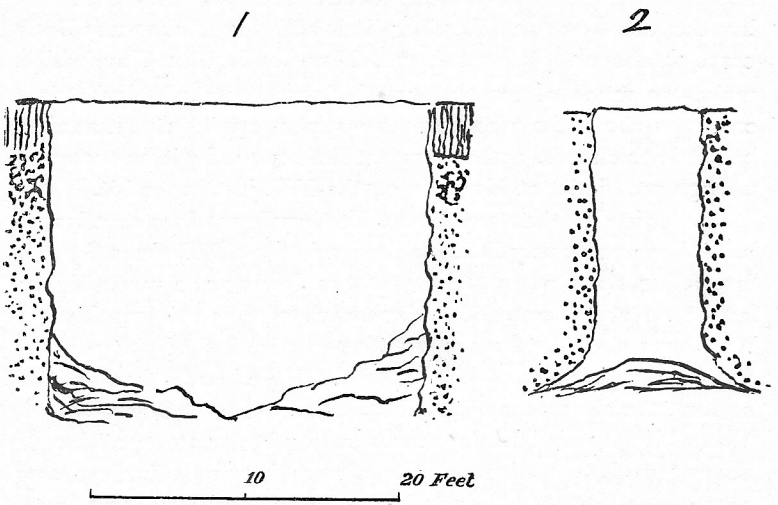
Mr. Cole having kindly forwarded the letter to me, I wrote to Mr. Squier, who was good enough to arrange to show me this strange hole on January 24th. Accordingly, on that day, I visited the spot in Mr. Squier's company. Its position is about 400 yards north-east of Collingwood Farm, which appears on the six-inch to the mile ordnance map (84 N.W.) at the north-eastern corner of Mucking Heath (see map). It was still circular in shape, though its diameter was slightly greater than when it was first seen, being a little more than 30 feet. The fall of material from its sides had left them still vertical, though it had reduced the depth of the pit from 20 feet in the centre to about 16 feet, and at the sides to 11 or 12 feet. The material seen at the bottom was simply that which had tumbled in from the sides. The lowest bed visible consisted of yellow sand, of which a thickness of about six feet was seen. Above it was about two feet of sand somewhat more clayey, containing small pebbles, and here and there fragments of shells, there being no definite line of separation between it and the sand beneath. The surface bed consisted of reddish-brown clay, precisely like London Clay which has lost the bluish tint characteristic of it at a certain depth.

Leaving this remarkable hole, we proceeded in a direction a little north of west, traversing the field on the western side of Witches Lane. There, Mr. Squier pointed out four circular depressions, with sloping sides, as probably marking the spots at which subsidences similar to that just seen had once occurred.



Map to show the position of the Mucking Subsidence (1906). Its position is shown by "O Hole." The four depressions occupy the ground covered by the words "4 Depressions on Surface." The "Gr" was probably meant for gravel.

These depressions were in a line from 400 to 800 yards westward of the recent subsidence, and their similarity in shape and breadth, though their sides were sloped, certainly makes this view highly probable. The only other explanation of their existence would be to consider them as simply disused gravel-pits. But their uniformity of shape, and distribution along a line across a single field, makes any supposition of this kind improbable in the extreme. For there is plenty of surface gravel in the fields around all the depressions mentioned, and many



Section No. 1—Mucking Subsidence (1906). No. 2—Blackheath Subsidences (April, 1878, and November, 1880). Both the latter were practically identical in size and shape.

gravel pits in all directions. There is no gravel at the surface of the recent subsidence, simply because it is at the head of a slight valley ranging southward from the plateau of old Thames gravel in which these (in all probability) older subsidences occurred. About a week later, wishing to examine the country west of these depressions, I noticed a shallower hollow of similar shape, on the southern side of the footpath leading to Orsett, in the field north-west of the Cock Inn.

It seems necessary at this point to introduce a brief account of the geological structure of this district, by which I mean that

part of Essex lying south of a line from Purfleet to Stanford-le-Hope. The lowest formation seen is the chalk, which is visible over a considerable part of it as far eastward as Grays and Stifford. Thence to Stanford-le-Hope and East Tilbury it appears only here and there, at the base of the higher ground bordering the marshes south of Little Thurrock and West and East Tilbury. Above the Chalk, with a northerly dip, come the Tertiary formations; the Thanet Sand, the lowest of them, being the only one now existing south of a line ranging from a point north of Hangman's Wood to Mucking Ford. North of this line the Woolwich and Reading Beds and the Blackheath Beds come on above the Thanet Sand. Then the London Clay (which makes so much of the surface of Essex north of this district) comes on above the other formations mentioned. But it attains but little thickness, and covers but little ground within our area, though prominent at Horndon-on-the-Hill, just beyond it.

Later in date than any of the Tertiary formations mentioned, and of comparatively little thickness, is the old Thames Gravel, formed ages ago when that river was flowing at a much higher level than at present. The deposition of this bed has been a most important influence in the production of the present physical geography of the district. Here, as higher up the stream, the old course of the Thames was usually northward of that which it now has, the result having been the deposition of River-gravel over most of the surface between Purfleet and Stanford-le-Hope and East Tilbury, the Tertiary formations having been much planed down during the operation. To illustrate the effects of this planing down I may mention the following examples. In the great chalk pit west of the road between Grays and Stifford we find old Thames Gravel with only 8ft. of the Thanet Sand between it and the Chalk. Then at Hangman's Wood there is about 46ft. of Thanet Sand between the Chalk below and the Thames Gravel above. At the recent Mucking subsidence there is in all probability a thickness of about 150ft. of Tertiary beds between the surface and the top of the Chalk. And though, owing to its position at the head of a slight valley, there is no old Thames Gravel at the surface of the recent subsidence, there is a broad plateau of it a few yards away both eastward and westward. And in each of these instances the height of the surface of the plateau above ordnance datum is

Of course, in classifying variable sands, gravels and clays, much depends on the nature of the information attainable by the geologist recording sections in them. However, in the present case the one important point is the depth to the Chalk from the base of the London Clay, which is nearly the same at each place. From the same volume of Mr. Whitaker's memoir we may learn that at Corringham a section showed that there were Tertiary beds 137ft. in thickness between the London Clay and the Chalk; at Laindon 138ft., and at Vange 127ft. 6in. Thus, remembering that the uppermost 11 or 12ft. in the recent Mucking subsidence are the lowest beds of the London Clay, and that the older subsidences westward have some old Thames gravel at the surface in addition, it is very improbable that the Chalk is at a less depth than 150ft. beneath any of them.

This depth makes it in the highest degree improbable that these Mucking subsidences owe their existence to a natural cause, such as the sudden filling in of a pipe in the Chalk. On the other hand this thickness of the intervening beds also makes it very improbable that they are the result of the collapse of a denehole *ending in the Chalk*. And the vertical sides and great breadth of the recent hole in themselves suggest the collapse of a chamber or chambers at no great depth Then, while a single pit of the denehole class might be a rare possibility (as in the case of that at Eltham), yet it is in the highest degree unlikely that a group of them would be made in a district where the total depth would be from 160 to 170ft., that is, double the depth attained by the deneholes of Hangman's Wood. At Mucking, too, besides the mere depth, there would be water difficulties, arising from the presence of clayey bands in the Woolwich series, from which the Hangman's Wood pits are free.

In short, a single pit ending in the Chalk, where these Mucking subsidences occur, might be a bare possibility, just as a well of that or greater depth might be sunk for the supply o some public institution, brewery or factory situated in a village. But the existence of a group of pits of this depth and special difficulty of construction is as unlikely as that of a group of very deep wells for the supply of the cottagers in the village street. In this district, too, where deneholes are known to abound wherever the Chalk is at the surface, or not more than 60 feet

about 100ft., though the depth to the Chalk varies from 8ft. to 150ft.

At the Mucking Hole we have not merely the full thickness of the Thanet Sand, but also that of the Woolwich and the Blackheath beds between the surface and the top of the Chalk. For the strata seen in the sides of the pit evidently belong to the basement bed of the London Clay. And the Geological Survey map shows London clay around the spot where the pit exists, while it evidently would also be found where the older depressions appear in the field westward, beneath the gravel forming the surface.

As regards the "Basement-bed" of the London Clay, the following details may be useful. Mr. W. Whitaker remarks in his Memoir, *The Geology of London and of Part of the Thames Valley*, Vol. I., p. 238 :—"Immediately at its base the London Clay commonly contains a greater or lesser admixture of green and yellow sands, generally mixed with rounded flint pebbles, and not unfrequently cemented by carbonate of lime into semi-concretionary tabular masses. These mixed beds, however, never exceed a few feet in thickness, and pass upwards rapidly into the great mass of the London Clay. To this part of the formation Mr. Prestwich has given the name of the 'basement bed.'"

The nearest section that I can find which will illustrate the nature and thickness of the strata between this basement bed of the London Clay and the top of the Chalk in this district is that of the well at Broad Hope Farm, about a mile eastward of Stanford-le-Hope. It is given in Mr. Whitaker's collection of *Essex Well Sections (Part IV.)* ESSEX NATURALIST, Vol. IX., p 178. For our present purpose a somewhat condensed account of it will suffice:—

	ft.	in.	ft.	in.
London Clay {clay	45			
London Clay {clay and sand	5			
Blackheath Beds (sands and gravels)	49	8		
Woolwich Beds (sand, gravel, and a little clay)	33	6	147	2
Thanet Sand (sand)	64			
Chalk				

The section at Thames Haven, given in Mr. Whitaker's memoir, *Geol. Lond., etc.*, Vol. II. p. 37, shows, when similarly treated:—

London clay	ft.	in.	ft.	in.
Oldhaven (or Blackheath) Beds (sand)	5	3		
Woolwich and Reading Beds (sand and sandy clay)	33	3	150	
Thanet Beds (sand and clayey sand)	111	6		
Chalk				

beneath it, the ancient inhabitants were evidently familiar with the knowledge of practical geology necessary to prevent them from wasting their time and labour in profitless excavations.

Indeed, the number of deneholes known to exist in this district suggests that it was one in which deneholes, or secret subterranean storehouses, were specially advantageous or even necessary to the residents within its borders in early times. And a glance at the geological map seems to indicate why this was so. Proximity to that great highway, the Thames, was once a matter of much greater importance and advantage to the people of Kent and Essex than can easily be realised now. But if we look at the course of the river we may note that spots close to it, and yet sufficiently high to be above the reach of floods, and consequently suitable for settlements, are not very numerous. We must remember, too, that in early times the marshes were not easily traversed as they now are, inasmuch as they were not enclosed by the banks which now exclude the water even at the highest tides. But the district in question has places on it which must always have been specially suited for settlement at Purfleet, West Thurrock, Grays Thurrock, and East Tilbury, close to the river, while Stanford-le-Hope and Mucking had a stream allowing the passage of boats to and from the Thames. On the other hand, the great drawback inherent in these advantages was the special temptation offered by the district to piratical raiders coming up the Thames, especially in times before and after the Roman occupation, when there was no Count of the Saxon Shore to keep pirates in check. Part of a piratical squadron might land on the eastern side of the Essex promontory at Stanford-le-Hope, the rest of the crews at Grays Thurrock or Purfleet, or at some spot on the Mardyke. Gravesend, on the Kentish shore, would be equally eligible as a site for dwellings, but its inhabitants, on the landing of pirates, would not find themselves liable to have their retreat inland cut off, as would the dwellers on the Essex promontory opposite. Hence, probably, a special demand for, and supply of, the secret storehouses known as deneholes, which might also during a raid serve as hiding places for women and children, while the fighting-men drew the attention of the invaders elsewhere.[1]

1 Those who fail to realise how mighty a terror pirates were but one thousand years ago to dwellers on the banks of the Thames and other rivers, should read the Anglo-Saxon Chronicle from the year 787 onwards, and remember that only the more important raids are mentioned.

But the fact that the deneholes which we know either in this part of Essex or at Bexley in Kent, end in Chalk, has caused the identification of deneholes with pits *in* the Chalk, if not *for* chalk, which is purely the result of accident. Chalk is the one comparatively hard rock existing at or near the surface where groups of deneholes have been found. Hence some of those ending in Chalk have lasted to this day. The depth, too, at which the chambers in the Chalk exist has caused them to be more or less choked up, after a period of disuse, by the fall of material down the shaft, there being a funnel-like orifice at the surface corresponding to the amount of material which has thus fallen, and the chambers themselves having suffered comparatively little by collapse. But deneholes in soft material, more or less strengthened by timber or brickwork, being often little, if any, deeper than many modern cellars, would collapse entirely after disuse, through the rotting of their timber supports, with a result at the surface more or less resembling that seen at the Mucking Hole. Indeed, one of them would scarcely ever be found except when its site was revealed by a subsidence. And should one be accidentally discovered uninjured, it would probably suggest to the discoverer, not an ancient structure, but simply a comparatively modern disused cellar, having no interest whatever for the antiquary.

Yet in the paper by Mr. F. C. J. Spurrell, entitled "Ensilage or Preserving Grain in Pits," appended to our Denehole Report[2] in 1887, we have abundant evidence that "the excavation of hollows in the soil for the purpose of hiding stores, whether in great *Silos* or in little *Cachés*, is a common practice over the whole world." Also that, while a very ancient method, it is in full exercise at the present time. The size of these pits, says Mr. Spurrell, varies considerably where they are still used. In central Asia a comparatively small hole is used for one family, while many small or one large pit would be required by the more wealthy. "Several families living near each other have their hoards close together, partly for convenience in finding them, and partly to prevent mutual robbery, a difficult feat where all eyes would be watching." Pits more or less similar are, we learn, common in Europe now, especially in the countries

2 Report on the Denehole Exploration at Hangman's Wood, Grays, 1884 and 1887. By T. V. Holmes and W. Cole, ESSEX NATURALIST, December, 1887 (Vol. i.)

bordering the Mediterranean. And, of course, the excavations are made in the surface rock of the locality in which they are needed. "The effort to keep out the damp is a constant trouble. It is accomplished in a measure by beating hard the sides of the pit, if of clay; by enveloping the deposit of corn with straw, reeds, fern, or bavins; by endeavouring to harden the sides by burning with fire, which could only be done in very shallow pits; by erecting wooden walls and floors; by covering with mastic or cement; and finally by building the interior either with stones, finished masonry, or with bricks and *terra cotta*."

I would also remind members of the Essex Field Club that on pp. 5 and 6 of Vol. II. of the ESSEX NATURALIST (1888) there is a "Note on the use of Pits in Brittany for Storage of Grain," by Charles Browne, M.A., who states that when travelling in Brittany in the preceding autumn he noticed slight mounds, sometimes in the centre, sometimes at the sides of the fields. Upon inquiring of the country people he was told they marked the sites of pits used for the storage of corn. They also told him that after filling a pit with stores of this sort they covered over the top with a layer of clay or earth, rammed hard to keep out the wet. The slight mound was simply to mark the position of the pit. Mr. Browne, unfortunately, was not able to examine any of these pits, but his note is valuable as showing subterranean storage to be still in use in a country so near our own as Brittany, and one, like Essex, bordering the sea.

I now pass on to consider the bearing of the remarks of Mr. Spurrell and Mr. Browne on the nature and distribution of these underground storehouses on the recent and (in all probability) earlier subsidences at Mucking.

I have already noted the advantages and disadvantages of the position of this Essex district between Purfleet and Stanford-le-Hope, and the special need of its inhabltants many centuries ago for secret storehouses when there was no Count of the Saxon Shore to protect south-eastern Britain from pirates. Hence, no doubt, the abundance of deneholes in the chalk between Purfleet and Hangman's Wood. But the people of that part of the district between Hangman's Wood and Stanford-le-Hope would need secret storehouses as much as their neighbours south and west, and would be compelled to make their subterranean granaries in the sands near the surface. For it

would soon be obvious to them, on trial, that nothing whatever was gained (around their dwellings) by an extra ten or twenty feet of depth, and that, in strata consisting of sands and gravels, with an occasional clayey band, though a foot or two of clay at the surface tended to keep a pit dry, a clay band near the bottom of the excavation tended to keep it wet.

Thus the three or four feet of London Clay at the surface where the recent Mucking subsidence took place would tend to keep dry any chambers in the sands beneath. The section where the older depressions westward exist is probably similar, with the addition, in their case, of a few feet of old Thames gravel. And the shape of the newest subsidence decidedly suggests the former presence of a large chamber, or group of chambers, at no great depth in the sands, which has now collapsed. In all probability a similar statement would be true of the depressions in the field westward. And it seems to me that the only probable explanation of their existence is that they mark the site of ancient pits of the denehole class, once used as granaries and storehouses.

In Palin's *More about Stifford* the author remarks, p. 40 (after quoting an account by Mr. R. Lloyd Williams of the deneholes of Hangman's Wood and elsewhere) :—

"We may add that a 'Danehole' partly filled up is to be found in the Stifford chalk quarry. But to show that chalk was not the object in making them, it may be mentioned that a series of them in Mucking Woods was filled up within the last few years, and these were in sand."

And on the same page he notes that :—

"Mr. J. E. K. Cutts, in an interesting paper on Billericay, read to the Essex Archæological Society at its annual meeting at Chelmsford, 1871, says, 'Not far from this tumulus is an excavation like a gravel pit, which the young labourer's father had told him was a 'Denehole' which had 'caved in.' He (Mr. Cutts) dug down 3 feet, but found nothing but a few broken tiles."

We have seen that at the Mucking hole the Chalk is probably about 150ft. beneath the surface. Now at Billericay, which is about eight miles nearly due north of it, and on the Bagshot Beds, which overlie the London Clay, the distance to the Chalk from the surface must certainly be more than 500ft. Yet we find "the young labourer's father" had no doubt that the excavation there was a "denehole" which had "caved in," and his recognition of it as a *denehole* showed that, at a place where there could never have been a denehole ending in Chalk,

they were nevertheless recognised by their traditional name. On p. 41 of Palin's *Stifford and its Neighbourhood*, Mr. R. Meeson says :—"A curious feature of the district is the occurrence of the Dane-holes *as they are called by the country people*," etc. (the italics are mine). He looks upon them as "simply excavations to obtain chalk for lime-burning," a view which the remark of the young labourer's father at Billericay is in itself sufficient to refute. In such a matter, indeed, the view of a man ignorant of and consequently free from the influence of antiquarian theories is of special value. And as apparently the caving in of a denehole at, or near, Billericay was not an excessively unusual occurrence in the experience of an agricultural labourer of middle or old age in 1871, this recognition of them there seems to suggest that they were known and used by the agricultural population down to a comparatively modern period. And the few broken tiles found in this Billericay pit, unsatisfactory as they may be as affording evidence of its antiquity, are at least important as human work found in it. For as these pits were mainly storehouses for grain and other vegetable produce, and were often strengthened where necessary by timber supports, their sudden collapse would leave in the ruins few objects of an imperishable kind besides the bricks or tiles which may have been used in their construction. Old villages and farmhouses are, in the great majority of cases, on sandy or gravelly soil, for the sake of the water supply attainable at a moderate depth ; and Billericay is no exception to this general rule. But underground chambers in such strata would have special need of an approximately water-tight roof. This might be afforded by a covering of tiles above a timber framework. Decay of the timber would in time cause a sudden collapse, with the result that tiles would naturally be the first and possibly the only durable objects of man's handiwork to be discovered by digging.

A paper, entitled "Miscellaneous Notes on Deneholes," which I read before the Essex Field Club on October 27th, 1883, ends with the following note, re-introduced here on account of its bearing on the Mucking subsidences and their probable explanation.

"Norfolk

My friend Mr. H. B. Woodward, of the Geological Survey, has kindly sent me the following account of the discovery of some buried wheat near Lammas

in E. Norfolk. It is given in a letter from Thomas Munro (?) to the late Samuel Woodward, dated 29th August, 1834. Mr. Munro thus writes :—" It was discovered on the side of a lane a little to the left of the road leading through Lammas to Buxton, where an acquaintance of mine was allowed to dig sand and gravel for top-dressing an adjacent meadow, and the quantity was not less than eight or ten quarters. . . . . An oak tree of considerable age grew near the spot, the fibrous roots of which had insinuated themselves among the wheat, which lay in two distinct compartments at the bottom of the sloping bank, separated by a natural division running transversely through the pit."

Also in Norfolk, at Caister near Yarmouth, was found in 1837 a bricked pit, an account of which appears in the *Gentleman's Magazine Library (Romano-British Remains), Part I.*, pp. 230-5. From the very full description of this pit we learn that :—" The masonry [of Roman bricks and tiles] was very rude, and there was no appearance of covering above, nor could we discover any traces of a paved bottom, there being nothing but the natural clay in which the whole was imbedded forming the floor of this oblong pit." Its length at the bottom was 11ft., and its breadth 7ft. At the top the length was 12ft. and the breadth 8ft. Its height had probably been " at least 4 feet." Among the remains found in the pit were oyster shells and fragments of Roman pottery. The writer of the account (T. Clowes) discusses the purposes to which this pit may have been devoted, rejecting the notions that it may have been a bath or a tanner's pit, and adding that it was " in truth so rude a building that my own idea is that its use was one of so ordinary and commonplace a nature as scarcely to be worth much speculation ; that it was Roman, beyond doubt, is I conceive the only point of interest."

We have, however, some reason for thinking that this rude pit was not devoid of interest, as Mr. Clowes supposed, for we find that " Mr. Woodward suggests that the building was intended for a corn store, but I scarcely incline to this supposition, as an underground vault, though very well for concealment in cases of necessity, would by no means be a corn store in a well-defended Roman encampment."

It is somewhat singular that Mr. Clowes was disinclined to accept Mr. Woodward's view for the reason given, even though he considered this pit as " constructed for some domestic purposes." For in a "Notice of the Barrier of Antoninus" by John Buchanan, which appears in the *Archæological Journal*, Vol.

15 (1858), we learn that "stones for grinding wheat, nay, large quantities of that grain itself, apparently charred, were found in what had been a subterranean granary in one of the Castella" (Castlecarey).

It is also worth recording here that in the *Gentleman's Magazine Library* (*Romano-British Remains, Part. II.*, p. 352) it is mentioned that in the old British camp in Wiltshire, known as Battlesbury, "a quantity of parched corn was found, some years ago, curiously preserved under ground in a sort of stone trough." Battlesbury is near Warminster, and stands on the western edge of Salisbury Plain. The date of this account of Battlesbury is 1787.

It may also be useful to note in this place that a brief account is given in *Trans. Essex Field Club*, Vol. iv., pp. 108-110, of ancient British subterranean granaries discovered in the camp known as Winklebury, on the borders of Wiltshire and Dorset, and of others in the Isle of Portland. A considerable amount of blackened corn was found in them at both the places mentioned.

Deneholes in the Chalk, even when destroyed (for instance) during the enlargement of a great chalk-pit, are visible during the progress of their destruction. If, like those of Hangman's Wood, and of Stankey and Cavey Spring, Bexley, they exist in groups which have made the areas they occupy useless for other purposes, they retain for centuries a certain proportion of open shafts, which allow their characteristic features to be noted. Consequently, whatever may be the views held by their explorers as to the purposes of their makers, to all they are obviously ancient and remarkable. But the shallower subterranean storehouses, in sand, gravel, and clay, would very seldom have their existence revealed except when the sudden collapse of their chambers disclosed their sites. When this occurred, they would be much more likely to have their true nature and former uses recognised by farmers and labourers whose families had long been resident in the locality, and who possessed traditional information about them, than to attract the attention of a local antiquary. For, apart from the fact that antiquaries are few in number, they naturally tend (like Mr. Clowes) to be interested in a rude subterranean chamber only when it contains coins, pottery, or inscriptions, and not when it

simply suggests some merely prehistoric or primitive domestic purpose. And unless seen when quite fresh, the subsidence caused by the collapse of an old subterranean storehouse would suggest something of special interest as little as the sight of a disused gravel or sand-pit.

I have, therefore, much pleasure in saying that we are greatly indebted to Mr. Squier for so promptly sending information about this most interesting Mucking subsidence. I have scarcely any doubt that in this, and in the hollows in the adjacent field, we have examples of those deneholes in sand mentioned by Palin as found in Mucking Woods, and which have been hitherto in this country almost entirely ignored, though recognised as existing, and now in use over large areas in Europe and Asia. Indeed, as I have already remarked, from the fact that the deneholes of south-eastern England have been preserved only when they end in the Chalk, simply because it is the only comparatively hard rock in those parts of Kent and Essex where they abound, their connection with the Chalk, which is only local and accidental, has been erroneously supposed to be essential. This mistake is one which the evidence afforded at Mucking and Billericay in Essex, and by Lammas and Caister in East Norfolk, will decidedly tend to correct.

THE ESSEX FIELD CLUB.—REPORTS OF MEETINGS.

SPRING RAMBLE IN EPPING FOREST AND 246th ORDINARY MEETING.

SATURDAY, MAY 19TH, 1906.

It has become almost an annual custom to open the summer session of the Club with a ramble in Epping Forest, and on this day one of these pleasant meetings was held. The assembling place was Theydon Green, and between 30 and 40 members attended. The route was through some of the most beautiful parts of the woodlands, looking their best in a delicate livery of pale green opening buds and white hawthorn blossoms.

The Conductors were Mr. S. A. Skan, of the Royal Herbarium, Kew; Mr. Miller Christy, President; and the Hon. Secretaries. Mr. Skan gave several extemporary demonstrations in the woods, his main text being the coming science of "Œcology" or "Plant Relationships," which is rapidly assuming importance because of its direct bearing on agriculture, horticulture, and forestry. Mr. Skan explained by means of fresh specimens from Kew, some most interesting examples of the methods by which plants adapt themselves to varying conditions of moisture, drought, shade, and sunshine, and the ways in which particular species

may spread themselves or even become dominant in certain localities. This last effect may be seen in Epping Forest in the great increase of birch trees in late years.

Mr. W. Cole gave a demonstration of the two kinds of oak-galls, which were to be observed so plentifully on the trees. One was the well-known "oak-apple" (*Teras terminalis*), the sexual generation of the root-gall *Biorhiza aptera*, found in the winter on the rootlets of the oak. The other was the currant-gall on the catkins (*Spathegaster baccarum*), the sexual gall of the oak-spangle found on the under side of the leaves from July to September. Mr. Cole gave a sketch of the life-histories of these, and the extraordinary dimorphism or "alternation of generations," which are so well illustrated by the two dual species of Cynipidæ under consideration. (The reader is referred to Mr. Lewis' paper in volumes XII. and XIII. of the ESSEX NATURALIST.)

Tea was taken in a tent, erected in Monk Wood by the kind permission of Mr. McKenzie, the Superintendent of the Forest, and afterwards the 246th **Ordinary Meeting** was held under the chairmanship of the President.

New Members.—Mr. F. McArthur Moir (*Indian Forest Service*), Deoban, Lexden Road, Colchester, and Mr. George Cross, Lee Wick, St. Osyth, were elected members.

Mr. Skan then continued his remarks on certain curious structures in plants having an œcological bearing. On the motion of the President a cordial vote of thanks was passed to him for his services at the meeting.

After some formal business and the announcement of the meeting of the Photographic Survey of the Club at Colchester on June 23rd, the members strolled through the woods to Loughton.

INSPECTION OF HAINHAULT FOREST.

SATURDAY, JUNE 9TH, 1906.

This meeting took place under very favourable conditions. The forest was entered by the road from Hainhault station. At the gate of the woods the party was met by Mr. Francis Dent, who very kindly acted as Conductor during the afternoon. Great regret was expressed at the absence of Mr. E. N. Buxton, who was unavoidably summoned to town for business connected with the Education Committee. Much interesting information as to the work being carried out was given by Head-keeper Jones, who takes much care of the developing plantations.

Demonstrations were given in various parts of the recovered lands by Mr. Dent, and also by Mr. T. S. Dymond, F.I.C., F.C.S., who had advised Mr. Buxton during the operations of laying down the land for grass, etc.

Everyone was pleased to notice the marked improvement since the visit last year, but several members were somewhat surprised at finding cattle roaming over all the lands, plantations as well as the open. It is obvious that a natural woodland can never grow while this system obtains. Our member, Mr. McArthur Moir, late of the Imperial Indian Forest Service, and Mr. W. Cole, from his knowledge of what has happened in Epping Forest, were very emphatic in their condemnation of the policy apparently being pursued in this regard.

Tea was taken in a tent erected on Cabin Hill, by kind permission of the London County Council. Afterwards an **Ordinary Meeting** (the 247th) was held, Mr. Miller Christy, F.L.S., President, in the chair.

Prof. E. G. Coker, M.A., D.Sc., etc., 3, *Farnley Road, Chingford*, and Mr. Charles E. Sankey, *Glen Lea, Dulwich Common*, were elected members.

Professor R. Meldola said that very many members would regret to hear of the death of Mr. Thomas Royle, F.C.S., who for three years had acted as Treasurer of the Club. Happily the Club had not before lost any officer by death, unless they excepted the late Mr. W. J. Argent, who had acted as Librarian for a short time in the first days of the Society. Professor Meldola moved that a message of regret and condolence should be sent to Mrs. Royle.

The motion was seconded by the President, and spoken to by the Rev. W. C. Howell, and was carried in silence.

Mr. Dent then delivered an address on the present condition of the Forest, and the prospects of the work of re-afforestation. He was followed by Mr. Dymond, who gave some particulars of the kinds of grasses sown, and the characteristics of the soil, etc.

A short discussion followed in which Mr. E. McArthur Moir, Mr. W. Cole, Rev. W. C. Howell, Mr. W. H. Dalton, F.G.S., Head-keeper Jones, and the President took part, and Mr. Dent replied on some points as to the admission of cattle, etc., which had been raised.

A very cordial vote of thanks was given to Mr. Dent for his services during the afternoon.

It is hoped that Mr. Dent's observations on the planted and grass lands made during the past few years may be embodied in a paper for the ESSEX NATURALIST. There can be no doubt but that Mr. Buxton's and Mr. Dent's records would be of great interest and value in time to come.

The ramble and demonstrations were continued during the evening, and the return train was taken at the Grange Hill Station.

PHOTOGRAPHIC AND PICTORIAL SURVEY OF ESSEX. ANNUAL MEETING.

SATURDAY, JUNE 23RD, 1906.

On this day a number of members and others interested in the Survey visited Colchester, and some very pleasant and instructive hours were spent in inspecting notable spots in the town, culminating in the first annual meeting of the Survey, which was held in the early evening in the Masonic Hall.[1]

The Survey has been inaugurated as a permanent Committee by the Essex Field Club for the purpose of gathering together a permanent collection of photographs and other pictures or objects of interest, and maps, plans, and other documents, so as to form a permanent and comprehensive survey and record of all that is valuable and representative in the county and the neighbouring rivers and sea. The rules also include the promotion of intercourse with kindred bodies, archæological and photographic societies, etc., and to arrange for the photographing of any objects not generally accessible. With such a worthy object in view, this offspring of the Essex Field Club should have a long and prosperous career, and the collections should prove interesting and instructive to all who appreciate this historic and picturesque county.

The general scope of the scheme upon which the survey is working was set out by Mr. A. E. Briscoe in a paper published in the ESSEX NATURALIST (Vol.

1 The Editor is indebted for the major portions of this account to the excellent reports of the meeting in the *Essex County Standard* and the *East Anglian Daily Times*.

XIII., pp. 1-5). A full prospectus was inserted in the part of the same journal for October, 1904 (Vol. XIII., part 7).

Favoured with delightful weather the company gathered at Colchester Cattle Market at 11 a.m., and were met by Alderman Henry Laver, F.S.A., Councillor Shenstone, F.L.S., Mr. W. Gill, F.R.Photo.Soc., and these gentlemen acted as guides throughout the day. Much of the success of the ramble was due to the lucid and full explanations of Dr. Laver, whose knowledge of the history and archæology of the town is probably possessed by no other man in such degree.

The party ascended Balkerne Hill, Dr. Laver explaining the various points of interest associated with the building of the old Roman wall in the first or second century A.D. At the Balkan Gate—which was viewed with special interest—the doctor remarked that this was one of the original entrances to the town, and shared, with a gate at Lincoln, the distinction of being the only two Roman archways of the kind remaining in England. Having viewed the old Roman guard-room, the company proceeded to St. Mary's steps, where they inspected the remains of one of the towers built in the wall for defensive purposes by the Romans.

At Mr. Gill's house in High Street, some beautiful specimens of the new art of tricolour photography were much admired, and Mr. Gill took an excellent photograph of the company in his garden.

At Sir Isaac's Walk, Alderman Laver pointed out stones at the side of the roadway, forming the top of the Roman Wall. Scheregate Steps, and the two bastions on the wall in Vineyard Street and Priory Street having been viewed, the ruins of St. Botolph's Priory were then visited. The Priory, remarked Dr. Laver, was founded in 1109, being entirely built with Roman tiles and *débris*. It was dedicated to St. Botolph, and was a very important monastery—indeed, in 1116 Pope Pascal gave it priority over all other Augustine monasteries in England. It was one of the most beautiful examples of early Norman building, but great care was needed to preserve the ruins. There was considerable difficulty in regard to this, as there were those who did not like to sacrifice the ivy which clung to the building. They thought it picturesque; but Dr. Laver said soon there would be no church and no ivy. The Church of St. Giles containing the vault where lie the remains of the "two valiant knights," Lucas and Lisle, who were shot after the surrender of Colchester, was then visited. The tomb, said Dr. Laver, was of special interest to him, for an ancestor of his was one of the Royalist colonels.

St. John's Abbey was then visited, the doctor remarking that its abbot was one of three who, at the dissolution of the monasteries, refused to acknowledge the King's supremacy, and was therefore tried for high treason, and hanged.

An adjournment to the Masonic Hall for luncheon was then made. Dr. Laver presided, and was supported by the Mayor of Colchester (Alderman Henry Goody), Alderman Wilson Marriage, Councillor J. C. Shenstone, Mr. A. E. Briscoe, B.Sc. (former principal of the Technical Institute, West Ham, and originator of the survey), and Mrs. Briscoe, Mr. A. Horsley Hinton (Editor of *The Amateur Photographer*), Mr. Horace Wilmer, F.R.P.S., Mr. Bryan Corcoran, Mr. E. McA. Moir, Mr. W. Gill, Mr. M. Veasey and Miss Veasey, Mr. W. Ping, Mr. G. E. Lyddon (hon. secretary Ilford and District Camera Club), Mr.

A. V. Taylor, Mrs. Robert Allen, Mr. T. W. Reader, F.G.S., Mrs. and Miss Crump, Mr. W. Cole, F.L.S. (Hon. Sec. E.F.C. and Curator of the Survey), and Mr. Victor Taylor (hon. secretary), with many others.

Dr. Laver gave the loyal toast, and said he must take that opportunity of thanking the Mayor for his personal interest, as displayed by his presence. (Applause.) The Mayor of Colchester represented the government of a town which was a municipality in A.D. 43 or 44, and had continued a municipality until the present time. Colchester had been represented in Parliament from time immemorial—even before London—and they were certainly much before London in the foundation of the town. The origin of London in all probability was that a Roman General had to wait on the shores of the Thames in some convenient position until they could get help from Rome, and Claudius settled down in that position, and hence came London. Colchester was very much more an antiquity than London, and was as old as any place in the Kingdom.

The Mayor, in acknowledging, said that it afforded him very much pleasure to meet that company on that their first visit, as a Society, to the town. He had reason to be proud of the town of which he had the honour of being Mayor, for to be Mayor of a city which took precedenee over London in point of age must, they would agree with him, be a privilege to be appreciated. He congratulated the members on having such able guides as Dr. Laver, Mr. Shenstone, and Mr. Gill, and in conclusion he assured them that if they came again to the interesting old town, they would be exceedingly glad to welcome them. (Applause.)

Mr. Shenstone added a word of thanks to Mr. Marriage for his presence and referred to the trouble and interest he had taken in preserving the antiquities of Colchester, an example of which—an old house in East Bay—they would visit during the afternoon.

Mr. Marriage said it had been a pleasure to make arrangements for an nspection of the place, and in referring to the objects of the society remarked, amidst laughter, that he would always be found ready and willing to do anything he could to welcome any of those who came from their younger and somewhat overgrown sister, London.

The company then proceeded to Tymperleys (Dr. Gilberd's birth place) and Trinity Church (his burial place), the old Grammar School in Culver Street, the Castle quadrangle and the Museum, and went by way of the Park, the Roman Wall, and Land Lane, to the old house by the side of Marriage's mill, which was inspected with interest, particularly the Board Room, which has been as far as possible preserved in its original state. An Elizabethan half-sovereign, of bright gold, had been found during the week in the earth under the flooring of the shop, which is still in the workmen's hands. Afterwards the members walked by the side of the mill river to view the pretty scenery. It is a diversion of the river, which was owned by the Colchester Corporation for an extent of more than 12 miles till it reached the sea, and Dr. Laver gave some interesting facts regarding the purity and extent of the beds of the celebrated Colchester oysters, and the steps taken to protect them by an efficient force of river police. Dr. Laver then left the company in the hands of Mr. Shenstone, but before he went Mr. A. E. Briscoe proposed a hearty vote of thanks to him for the trouble he had taken. Dr. Laver, in returning thanks, said it always afforded him great pleasure in taking strangers round the town, of which he was so proud, and which was, in an historic sense, one of the most interesting in Europe.

A short journey on the tram took the party to the residence of Dr. Nicholson, by whose kindness and hospitality tea was partaken in the lovely rose garden, and before leaving a vote of thanks, proposed by Mr. Briscoe and seconded by Mr. W. Cole, was accorded to Dr. Nicholson.

The first Annual Meeting was held in the Masonic Hall under the Chairmanship of Mr. Briscoe, who was supported by Mr. Victor Taylor (hon. sec.) and Mr. Shenstone. Mr. Taylor read letters of apology for absence from Lord Rayleigh (Patron of the Survey), Mr. J. McIntosh (Secretary of the Royal Photographic Society), Viscount Middleton (President of the Photographic Survey of Surrey), Professor Meldola, F.R.S., Sir Benjamin Stone, Mr. F. W. Rudler, I.S.O., F.G.S., Mr. G. Scammell (hon. sec. National Photographic Record Association), and a number of other gentlemen. Mr. Taylor read the Annual Report for the year ended December 31st, which was as follows :—

"Considering that this Association has only recently completed the first year of its existence, fair progress has to be recorded, although so far fewer contributors have offered their assistance either in donations towards the expenses or in kind than had been anticipated. Among those who have come forward to assist in the important work, the thanks of the Council of the Survey are especially due to the Woodford Photographic Society, whose handsome contribution of a set of about 200 prints, comprising the survey of Woodford, is as artistic as it is comprehensive. Fortunately this Society commenced the work several years ago, and some of the prints record parts of the district the aspect of which has since been completely changed in giving place to modern requirements. This only emphasises the necessity of record work being proceeded with without further delay, for our towns and villages are rapidly undergoing change, and relics of bygone days and curious customs are fast disappearing, soon to become merely a memory, unless a systematic record is now undertaken. Many good prints, and also engravings of value, showing the old mansions and churches as they were a century or more since, have been sent in by members of the Council and by individual contributors ; the Essex Field Club has contributed towards the requirements of its child, the Survey ; Mr. Miller Christy, the President, has generously handed over about 200 rare and interesting engravings and process-prints ; while numerous friends are engaged in surveying. The accounts made up to the end of 1905 showed there were only 26 subscribers, and there was a balance in hand (which has since been diminished) of £5 10s. 9d."

The Chairman said the report, on the whole, was a very satisfactory one, and he hoped that at the end of next year, when the Survey had become better known, they would have to record a larger number of gifts. In giving a short address on the object and work of the Survey, Mr. Briscoe mentioned that the Town Council of West Ham had agreed to house the prints and other contributions in the Essex Museum of Natural History, and to provide cabinets and other necessities for safe preservation, on the condition that the collection was a permanent one. Should the Survey go out of existence at any future time the Corporation would take up the control of it, so that permanency would be secured. The Chairman appealed to the amateur photographers in Essex to give the Survey as much help as possible. They could communicate with the Secretary, who could suggest a particular district for their operations, so that every neighbourhood in the county might be properly worked. From a neighbourhood like Colchester they ought to have the assistance of 30 or 40 photographers, and they would be pleased to receive contributions. He also appealed to all who had

interesting prints or drawings that they would be willing to contribute. In conclusion, he thanked Dr. Laver and Mr. Shenstone for what they had done that day, and Mr. Victor Taylor, who had made such excellent arrangements. (Loud applause.)

Mr. Shenstone acknowledged the compliment, and the Meeting ended.

MEETING IN THE DANBURY AND LITTLE BADDOW DISTRICTS IN CONJUNCTION WITH THE GEOLOGISTS' ASSOCIATION.

SATURDAY, JULY 7th, 1906.

Directors: A. E. BRISCOE, B.Sc., MILLER CHRISTY, F.L.S., W. COLE, F.L.S., F.E.S., T. W. READER, F.G.S., and A. E. SALTER, D.Sc., F.G.S.

This meeting was a whole-day one, planned for visiting the commons and woods of this delightful part of our county, and, with the assistance of expert members of the Geologists' Association—particularly Dr. Salter—special attention was paid to the geology of the district traversed.[1]

The party assembled at Chelmsford Station soon after 10 a.m., and proceeded in brakes to Great Baddow, where the waterworks belonging to the District Council of Chelmsford were inspected under the direction of Mr. J. Dewhirst, A.M.I.Mech.E., who had placed out a sectional diagram of the bore-hole and samples of the various strata passed through for the inspection of the members. His remarks are embodied in the following account:

"The position of this bore-hole is at the outcrop of the clay bed forming the valley of the Chelmer, and is the site also of a strong spring of water draining the gravel which extends from the site to Galleywood, and which for many years was the source of the supply of water for these works.

"The yield of the spring from this gravel formation varies from 60,000 to 120 000 gallons per 24 hours, and is now supplemented by water obtained from the bore-hole.

"The surface level is 97ft. O.D.; the boring is 311ft. deep and 10in. in diameter. It is lined with steel tubes of 10in. internal diameter to a depth of 350ft., beyond which are 8¾in. internal diameter perforated steel tubes.

"The work of boring was commenced in February, 1891, and was completed in October of the same year.

"The strata passed through are as follows:—

	ft.	in.	Depth from Surface. ft.	in.
Soil	2	0	.. ——	
Yellow Clay	1	6	.. 3	6
Yellow Gravel	10	6	.. 14	0
Red Loamy Sand	1	0	.. 15	0
Yellow Gravel	12	0	.. 27	0

1 The Editor is greatly indebted to Dr. Salter for furnishing nearly all the matter of this report.

			Depth from Surface.	
			ft.	in.
Black Gravel	1	6 ..	28	6
Yellow Loamy Sand ..	1	0 ..	29	6
Yellow Gravel (very sandy) ..	9	6 ..	39	0
Brown Clay	1	6 ..	40	6
Blue Clay	68	0 ..	108	6
Clay Stone		6 ..	109	0
Blue Clay	141	6 ..	250	6
Dead Clay Sand	16	6 ..	267	0
Dead Grey Rock	1	6 ..	268	6
Dark Grey Dead Sand ..	12	0 ..	280	6
Black Pebbles	1	0 ..	281	6
Live Grey Sand	5	0 ..	286	6
Sand and Sea Shells ..	1	6 ..	288	0
Grey Sand	13	0 ..	301	0
Sandy Clay mottled ..	28	6 ..	329	6
Grey Sand	64	0 ..	393	6
Green Flints	1	6 ..	395	0
Chalk	2	0 ..	397	0

"The rest level of the water on commencing pumping was 80ft. from the surface, and after continuous pumping day and night for 14 days this was lowered to 145ft. from the surface; the rate of pumping was 72,000 gallons per 24 hours. In this boring no attempt was made to obtain water by going into the chalk formation, and other borings in the immediate neighbourhood have proved that little water is obtained from that source.[2]

"Pumping from this bore-hole is now carried on at from 4,000 to 5,000 gallons per hour by means of an air-lift plant, and after heavy continuous work the water level is occasionally lowered to 160 ft. from the surface, but afterwards the water rises rapidly.

2 The following data kindly supplied to Mr. A. C. Young, F.C.S., by Mr. Reginald Watney, may be of interest for comparison:

WELL SECTION GREAT BADDOW BREWERY.

			Depth from Surface.	
	ft.	in.	ft.	in.
Dug well	300	0 ...	(No account)	
Broken brick rubbish...	16	0 ...	316	0
Hard Clay	10	0 ...	326	0
Claystone	1	6 ...	327	6
Hard Clay	3	6 ...	331	0
Clavey Sand	1	6 ...	332	6
Pebbles	3	6 ...	336	0
Live Sand	11	0 ...	347	0
Hard Clay	5	0 ...	352	0
Pebbly Sand	0	6 ...	352	6
Mottled Clay	6	6 ...	359	0
Sand and Stone	9	0 ...	368	0
Sand and Clay	30	0 ...	398	0
Thanet Sand	48	0 ...	446	0
Chalk and Flints	304	0 ...	750	0

No water in the Chalk. Water came in at 332 ft. 6 in. to 347 ft. and at 359 ft. to 368 ft.

"The water is absolutely pure and very soft, as the following analysis made by Dr. J. C. Thresh, at the County Public Health Laboratories, Chelmsford, in March, 1902, will show :—

"*Saline Constituents of a sample of water from Great Baddow (Bore) Waterworks.*

"*Estimated in parts per* 100·000.

Ca. ·8	Mg. ·325	Na.	CO_3 21·2	SO_4 7·3	Cl. 37·6	NO_2 ·2	Probable Combinations.	
·8	..	..	1·2	..	..	..	Calcium Carbonate ..	2·0
..	·325	..	·8	..	..	..	Magnesium Carbonate	1·1
..	..	14·7	19·2	..	..	..	Sodium Carbonate ..	33·9
..	..	3·5	..	7·3	..	..	Sodium Sulphate ..	10·8
..	..	24·45	..	..	37·6	..	Sodium Chloride ..	62·05
..	..	..	..	..	..	·2	Nitrates, etc.. ..	1·65
							Total solid constituents dried at 180° C.	111·5

"Other determinations :

Hardness, Temporary or Permanent—total	4°
Free Ammonia	0·08
Organic Ammonia	0·002°
Oxygen absorbed in four hours at 27° C..	0·012°
Nitrates	Nil.

"*Note.*—To convert the above parts per 100·000 into grains per gallon multiply by ·7."

The party now proceeded across the road to the large gravel pits known as the Old Bee Hive Quarry, where they were met by the owner, Mr. Robert Jackson, who afforded every facility for the examination of this interesting section.

The gravel is worked to a depth of 45 ft. The lower portion consists of finely stratified gravel, above which is a gravel arranged somewhat tumultuously. In the surface soil above fragments of Roman or Romano-British pottery are occasionally found. Mr. Jackson exhibited to the members some pieces recently obtained.

The constituents of the gravel are principally flints, some of which are over a foot long. Sarsens of moderate size occur, the one at the "Beehive" close by having been obtained from this pit. Others were seen lying about. Quartz blocks and large pebbles from the Bunter formation were abundant, and many small boulders of Rhyolite similar to those found at higher levels (*cf.* Beggar Hill, near Fryerning) at 300ft. O.D. Some large blocks of conglomerate resembling Hertfordshire "Pudding-stone" also occur.

The materials appear to be derived from higher and older gravels which formerly existed to the south and west.

Mr. Jackson kindly provided some photographic picture-cards as mementoes of the visit. A very hearty vote of thanks was given to him for his assistance and courtesy.

The drive was then continued to Danbury Palace, where the members were heartily and hospitably received by Sir Thomas Hanbury, K.C.V.O., and an inspection made of the house and pictures. Under Sir Thomas' guidance a very

pleasant ramble was taken in the park, which comprises about 250 acres. It is an undulating expanse with fine oaks and cedars, and parts of the estate are covered with virgin woodland.

The party then ascended the hill to the well-known hostelry the "Griffin" (mentioned in the introduction to "Waverley" and in Strutt's romance of "Queenhoo Hall"), where lunch was served.

This was the fourth visit of the Club to this notable district, and many particulars of Danbury will be found in our publications. The remains of the old Danish Camp were described by Mr. F. C. J. Spurrell, F.G.S., in the ESSEX NATURALIST, vol. iv., p. 138, and there a plan of the relic was given. Many notes on the natural history of the district may be read in the reports referred to. The botany has been celebrated since the time of Gibson's *Flora of Essex*. As may be gathered from our President's book, the bird fauna is exceptionally rich, while many rare insects have occurred in the old days on these upland commons, now, alas, so woefully diminished by "land-grabbers"—the fate of nearly all open land in our county.

The Church of St. John-the-Baptist[3] was visited under the guidance of the Vicar, the Rev. J. B. Plumtree, M.A., who gave a full and interesting account of the building. The church occupies the highest point in the village, and its tapering spire is a well-known landmark over a large part of the county. Danbury Common, 300 ft. O.D., was then crossed in order to view the large excavations for gravel which are to be seen there. Dr. Salter showed that Danbury Hill owed its existence to the sheet of gravel which capped it, and which had resisted denudation while the softer clay land around had disappeared. The gravel, sand, and clay were much contorted, and the Director pointed out that these might be due to one or more of the following causes:—

(*a*) The former presence of calcareous beds below the gravels, which, on being dissolved away by the water percolating through the gravel and sand, caused the superincumbent insoluble beds to fall in. This explanation is not probable, as the only calcareous beds likely to occur would be Crag, and of this there is no sign.

(*b*) Earth-movements of a wide-spread character.

(*c*) The slipping of the subjacent London Clay down the steep slope, thus disturbing the gravels, etc., above. In this connection it is noteworthy that an important spring occurs close by at a rather lower level.

(*d*) The impact of an ice-sheet. Mr. F. W. Harmer, F.G.S., writing to the Director regretting his inability to attend the excursion, wished him to state that he believes "the mounds of gravel, etc., at Danbury and Tiptree Heath represent the terminal moraine of the Essex ice-sheet, rather than the denuded remnants of a once more widely-spread deposit."

Dr. Salter pointed out that the constituents of the gravel showed it belonged to the same series of deposits as are found at Beggar Hill, around the Stevenage Gap, and along the northern slope of the Lower Thames Valley at various localities, which he regarded as of fluviate origin. The time allowed did not permit of a thorough examination of all the interesting points connected with this important deposit, and it is to be hoped that in the near future another opportunity for doing so will arise.

3 For a description of the church consult Mr. Chancellor's paper in the *Essex Review* for January, 1893.

The conveyances were sent off to Little Baddow and the party walked across Lingfield Common (noticing the sundew (*Drosera*) and other interesting plants by the way) to Little Baddow. At the small and ancient church (Virgin Mary) the party was met by the Rector, the Rev. T. J. Taylor, who described the interesting features of the building. It is chiefly of rubble-work, and with Roman tiles in places. The south door is probably Norman. It contains many interesting monuments, two at least supposed to date from the time of Stephen, and there are two piscinæ. Altogether a church well worth visiting. At the "Hoppitt" the members received a very hearty welcome from Mr. and Mrs. Briscoe, and tea was taken in the garden. Then, in the building itself, which closely adjoins, the Rev. J. Burgess gave an account of the Old Independent Chapel, and the notable men who had been connected with it. The Huguenot family of Morrell[1] were closely connected, with Little Baddow as pastors of the Chapel. The most distinguished was John D. Morrell, who was born at the Manse in 1816, who was well-known as a as a philosophical writer and author of Morrell's *Grammar*. John Eliott, the "Apostle to the Indians," lived at the farmhouse called the "Cuckoos," where with Thomas Hooker, excommunicated by Laud, he carried on a school, and preached at the Chapel, before both embarked on the "Lyon" for Boston.

A short **Ordinary Meeting** (the 248th) was held to confirm the minutes, and very hearty votes of thanks were passed to Mr. and Mrs. Briscoe for their kindness, and to Dr. Salter and the Rev. J. Burgess for their most valuable services. The return journey was by way of Boreham and Springfield to Chelmsford. The day was beautifully fine, and a most enjoyable day was spent in this pleasant district, one of the most delightful in Essex to the naturalist and archæologist.

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Geological Survey Map, No 1, N.E.
Ordnance Survey Map, No. 241.
1899. WHITAKER, W. "Geology of London," vol. i.
1904 SALTER, A. E. "On the Superficial Deposits of Central and parts of Southern England." *Proc. Geol. Assoc.*, vol. xix. pp. 30, 31, where other references are given.

DEDICATION OF PART OF HAINHAULT FOREST AS AN OPEN SPACE.

SATURDAY, JULY 21ST, 1906.

On this afternoon the dedication of the rescued portions of Hainhault Forest for the use of the public for ever was made by the Right Hon. the Earl of Carrington, President of the Board of Agriculture and Fisheries, under the conduct of Mr. Evan Spicer, J.P., Chairman of the London County Council. An account of the ceremony and details of the lands dedicated is crowded out in this place; but will be given in the next volume of the ESSEX NATURALIST.

1. A very full account of the Morrells and of John Elliott, and their connection with Little Baddow, will be found n the *Essex Review*, vols. i. and iii.

MEETING IN THE BRAINTREE-FINCHINGFIELD DISTRICT AND VISIT TO SPAINS HALL.

SATURDAY, JULY 28TH, 1906.

This meeting had been arranged to traverse an interesting stretch of country not previously visited by the Club, and to take advantage of the very hospitable invitation of Mr. and Mrs. Archibald Ruggles-Brise to visit them at their fine old mansion, Spains Hall, which is so interesting and attractive to all taking an interest in Tudor domestic architecture.

The party assembled at Braintree Railway Station at a quarter to eleven, where it was met by our member, the Rev. J. W. Kenworthy, Rector of Braintree, under whose guidance several interesting features of the twin-towns of Braintree and Bocking were inspected—particularly the many picturesque Tudor and Jacobean houses in Bradford Street, with carved beams and parge-wood fronts, and the extremely picturesque old mill by the bridge over the River Pant, in Bocking. Thence the conveyances were resumed to Bocking Church, where the more interesting features of the fine building were demonstrated by the Very Rev. J. S. Brownrigg, Dean of Bocking, and Colonel G. S. Saville, J.P., one of the Churchwardens. Time would not permit of a prolonged stay, and the drive of ten miles to Spains Hall was resumed, the route being by way of the villages of Panfield, Shalford and Wethersfield. Much of the way was through charmingly picturesque country, and with perfect weather, and flower-decked lanes and hedgerows, the drive was much enjoyed by all taking part in it.

Finchingfield Church was reached at one o'clock, and here Mr. Ruggles-Brise met the members. Mr. Ruggles-Brise being one of the Churchwardens and thoroughly acquainted with the building, was enabled to give much information, and Mr. Kenworthy ably seconded his expositions.

At the Hall, a mile or more distant, a most kindly and hospitable welcome was given to the company by Mrs. Ruggles-Brise, who led the way to the luncheon table, spread on one of the lawns in the shade of the mansion. Here were several ladies and gentlemen of the neighbourhood, including Sir Fortescue Flannery, Bart., of Wethersfield Manor, Colonel Gordon, of Wethersfield Place, and the ladies of the family.

After lunch, the members were invited to inspect the fine old Tudor mansion and its extensive and beautiful grounds. In the latter are the seven fish-ponds—now all dry, except one—dug by William Kemp, a former owner of the estate, about the year 1620, one being made by him during each of the seven years of silence which he imposed upon himself as a penalty for a hasty word to his wife. Among much beautiful timber, one lime tree of exceptional size and three fine cedars, growing close to the house, were greatly admired.

Leaving the gardens, the dairy – probably the largest and best equipped in East Anglia—was visited. An extremely fine herd of no fewer than fifty pure-bred Alderney cows is kept, and as much as 250 lbs. of butter have been made in one week,

Miss Ruggles-Brise's stable of no fewer than fourteen pedigree donkeys was next inspected, and her singularly skilful exhibition of driving a four-in-hand team of well-bred donkeys formed one of the most original and charming features of the day.

The mansion was also viewed, within and without, under the guidance of our hosts. Though not large, it is an extremely good and pure example of a

Tudor country house, built wholly of red brick, as were most of the many fine Essex houses of the period—one of great prosperity in the county. Two gables on the western side appear, however, to be considerably—probably more than a century—earlier, and they have carved barge boards. The interior of the house shows much fine oak panelling. In the dining room hang portraits of the Ruggles family, to which Mr. Ruggles-Brise belongs, by Russell, the great pastel-painter, dating 1794. Among them is one of Mr. Thomas Ruggles (who died 1813), a prominent agriculturist in his day and one of the original founders of the Board of Agriculture, and an intimate friend of Arthur Young, the famous traveller, writer on agriculture, and Secretary of the Board, of whom also there is an original portrait in oils by Russell. Young was a frequent visitor to Spains Hall and a number of his letters are preserved in the house.

With regard to the period of the house (which in the guide-books is commonly referred to the "spacious days of Great Elizabeth") Dr. Henry Laver, F.S A., in a letter to the Editor, dated July 22nd, remarked:—"Spains Hall is in a very small degree Elizabethan. All the north side, where the old entrance was, with a later bridge across the moat, is not later than Henry VIII; the chimneys, several of them, are also of this period In fact the house may be said to be of the time of Henry VIII. with Elizabethan and later additions. It was also a moated house, and I was able, when I saw it, to find very evident traces of the whole course of the moat. I mention this, as the Tudor, as distinct from Elizabethan work might be possibly passed over, but after careful study there can be no doubt of the period. The first thing which struck me, in driving up to the house, was the distinctly pre-Elizabethan chimneys."

During the afternoon a formal Ordinary Meeting (the 249th) was held on the lawn, the President in the chair.

The following were elected members of the Club:—Mr. G. L. Bruce, M.A., *Woodberry Knoll, Loughton*; Colonel A. Gordon, *Wethersfield Place, near Braintree*; and Mr. Harold F. Hodgson, 60, *High Street, Brentwood*.

On the motion of the President a very cordial vote of thanks was passed, amid hearty applause, to Mr. and Mrs. Ruggles-Brise, for their kind and hospitable reception of the Club.

Mr. Ruggles-Brise showed a large manuscript map, dated 1618, of the Spains Hall Estate, with pheasants, rabbits, squirrels, and other animals curiously represented in the woods surrounding the mansion.

Owing to lack of time, a paper by the Hon. Secretary (Mr. William Cole, F.L.S.), on "The Exploration of some Red Hills in Essex, with remarks upon the Objects found" (see ESSEX NATURALIST, Vol. xiv., pp. 170-183), had to be taken as read.

The return journey was made by way of Great Bardfield, the Salings, and Rayne. Tea was taken by the way at the ancient "Vine Inn" at Bardfield, and the members returned to their homes by evening trains from Braintree, having enjoyed a singularly pleasant meeting.

EXCURSION TO RAYLEIGH HILLS, ESSEX (HADLEIGH, THUNDERSLEY, AND DAWES HEATH).

SATURDAY, SEPTEMBER 15TH, 1906.

A Field Meeting in conjunction with the Geologists' Association was held on this afternoon. The Directors were A. E. Salter, D.Sc., F.G.S., and

Thomas W. Reader, F.G.S. (the *Hon. Librarian*), who kindly acted for the Secretaries during their absence on vacation.

The Editor is much indebted to Dr. Salter for the ensuing report of this meeting.

The party left Fenchurch Street at 2.6 p.m., and on arriving at Leigh-on-Sea ascended the steep slope which leads to Leigh Church, and after some difficulty obtained conveyances to Thundersley.

The first section visited was situated a little east of the Reservoirs, where 5 ft. or 6 ft. of gravel resting on sand was exposed, at about 250 ft. O.D.

Dr. Salter pointed out that the Rayleigh Hills, upon one of the highest parts of which they were then standing, were formed of London-clay, which was overlaid by Bagshot-sand. Above these, patches of gravel similar to that now before them occurred, and these by preserving the subjacent strata from the action of denuding agencies, had preserved them, while all around had been denuded away. The Director then drew attention to the composition of the gravel, which, in addition to débris from Tertiary strata, *e.g.*, sarsens, flint, pebbles, etc., contained a considerable amount of Lower Greensand Chert from the Wealden area to the south of the Thames. Some of the gravel had been consolidated into a hard ferruginous conglomerate. If the hypothesis that these outlying patches of gravel were formed by former streams from the Wealden Area were correct, it showed that since the gravels were deposited the lower part of the Thames Valley, as we know it, had been initiated.

In comparing this deposit with that seen at Beggar Hill earlier in the year[1] it was pointed out that the Bunter débris and Igneous rocks present at the latter were absent in the former. Also nothing derived from Jurassic strata or Basalt was observed at either of them.

Dr. Salter also remarked that Eoliths were likely to occur here, and that he had obtained one which had satisfied Mr. A. S. Kennard, F.G.S., who also expressed the opinion that the gravel was a likely one for their occurrence.

The remarkably fine view from this point was greatly admired, the Langdon Hills standing out well to the east.

A few days before the meeting some Essex papers stated that discoveries of flint implements had been made at Thundersley, and also that a band of marine shells had been found there. Some members investigated these reports, and found that a few well-worked neolithic flakes had been found by Mr. Mabey in his garden,[2] and the Director was able subsequently to examine the "marine shells," which proved to be ferruginous concretions from the Bagshot strata.

Proceeding to Dawes Heath, the party were shown a section in what is known as the Bramble Hill Pit, which from the Director had recently obtained a fair-sized boulder of green Oldbury Chert. The gravel was similar to that already seen, and rested on Bagshot Sand.

Another section close by was visited, and then a sharp walk through the woods brought the party to the "Crown" at Hadleigh, where tea was obtained.

Some few members found time to examine Hadleigh Church, into the wall of which a large sarsen has been built, and to visit the ruins of Hadleigh Castle.

In replying to the vote of thanks proposed by the President the Director

1 *Proceedings Geol. Association*, Vol. xix., p. 317.

2 These Flints were subsequently exhibited at the meeting of the Club on November 7th.

stated that he hoped, in spite of the unfortunate delay, he had been able to bring out the following points :

1. That the Rayleigh Hills owe their existence as such to the occurrence of porous gravel and sandy patches which have resisted denudation.

2. That the presence of Lower Greensand Chert in the gravels points to former fluviatile connection with the Wealden Area.

3. That large boulders (sarsens) occur in these gravels at 250ft. O.D., which are rarely if ever found in the much more extensive gravels at lower levels (70ft.—80ft. O.D.), *e.g.*, at Southend (in Southchurch Road) and at Westcliff, etc.

4, That flints showing Eolithic chipping, similar to those on the Plateau south of the Thames, probably occur on the Rayleigh Hills in beds of stratified gravel.

The party returned to London by the 7.20 p.m. train.

REFERENCES.

Geological Survey Map, No. 1, S.E. and N.E.

Ordnance Survey Maps, Nos. 258 and 259.

1889. WHITAKER, W.—"Geology of London," vol. i.

1905. SALTER, A. E.—"On the Superficial Deposits of Central and Parts of Southern England." *Proc. Geol. Assoc.*, vol. xix, p. 1. *et seq.*

FIRST FUNGUS FORAY IN CONJUNCTION WITH THE BRITISH MYCOLOGICAL SOCIETY.

WEDNESDAY, OCTOBER 3RD, 1906.

During the week from the 1st to the 6th of October, the British Mycological Society held its annual Fungus Foray in Epping Forest, under the Presidency of our esteemed member, Mr. Arthur Lister, F.R.S., F.L.S. The members of the Essex Field Club were cordially invited to join in the Foray, and especially on the Wednesday. The management of the meetings was in the hands of the courteous Hon. Secretary to the Society, Mr. Carleton Rea, B.C.L., M.A., etc., who was formerly a member of the Club, previously to his removal to Worcester.

The Mycological Society established their headquarters at the Forest Hotel, Chingford, where a room was reserved for exhibition and examination of specimens. Many expert members of the Society attended, and having the whole week to explore the Forest, it was not surprising that many interesting species were found, and a grand addition made to our mycological flora. On Tuesday, October 2nd, the members drove to Piercing Hill, and that portion of the Forest to the "Wake Arms" was searched. On Thursday Loughton Camp and ground, thence to the "King's Oak," was taken ; next day Honey Lane Quarters was the scene of the hunt. The meeting with the Essex on the Wednesday was occupied with Great Monk Wood, thence to Little Monk Wood and High Beach.

As the result of the work Mr. Rea was enabled to report an addition of no less than 52 species to the list as published in the ESSEX NATURALIST, Vol. III. pp 248-71. Mr. Rea wrote "there is one *Hypochnus* that I have not yet run down, and other members of the Society may furnish me with results that may

add to this list of Hymenonycetals, and they will certainly add greatly to the number of recognised species in other branches of the subject. Miss A. L. Smith has, I believe, a Mould new to Britain. I can report that we collected over 250 species of Hymenomycetes during the week's foray, and 16 species of Mycetozoa were identified. We passed a great number of *Russulæ*, in review, finding altogether some 25 species, but *Clitocybe* and *Clavaria* were almost absent from the woods during our visit. . . . . We shall always have a very pleasant remembrance of the enjoyable time we all spent in Epping Forest, and of your kindness to us at the Foray,"

The additions made will be incorporated in the revised "List of the Hymenomycetal Fungi of Essex" by Dr. M. C. Cooke and Mr. Massee, F.L.S., now being prepared for publication.

In the evening the members dined together at the Royal Forest Hotel, when in addition to the ladies and gentlemen connected with both societies, Mr. Christy, Mr. Andrew Johnston, and Mr. W. Cole represented the Essex Field Club. During the evening Mr Arthur Lister, F.R.S., gave an address on the study of the Mycetozoa, illustrated by living specimens and by a long series of beautiful coloured drawings from the pencil of Miss G. Lister, F.L.S.

ANNUAL FUNGUS FORAY.

SATURDAY, OCTOBER 20TH, 1906.

Inasmuch as the British Mycological Society had fully explored some of the ground near Loughton, it was thought best to take the more northerly parts of the Forest as the scene of our own collecting. The headquarters were, therefore, fixed at "Ye Olde Thatched House" in Epping. The first party drove from Loughton Station at about 11 o'clock to the "Clay-ride," and rambled thence to Amesbresbury Banks, filling their baskets on the way. Fungi were fairly abundant, and a very striking sight was the magnificent groups of the handsome scarlet *Agaricus muscarius* which were encountered. The carriages were then resumed to Epping, where the afternoon party was met, and then the northern parts of the Forest, Wintry Wood, etc., were explored. Mr. George Massee, F.L.S., and Mr. E. M. Holmes, F.L.S., with many other botanists, acted as referees. A most enjoyable day was spent, and all assembled at the headquarters for tea. The vast numbers of specimens obtained (comprising about 150 species) were exhibited on tables in a room as usual at these meetings, and were carefully examined, identified and labelled by Mr. Massee and the other experts present.

It should be mentioned that, as in several former years, many members of the Selborne Society joined in the foray.

During the evening a meeting was held, Mr. Miller Christy, F.L.S., President, in the chair.

The President announced with deep regret the death of Prof. Marshall Ward, F.R.S., one of the honorary members of the Club. Sympathetic speeches were made by Mr. E. M. Holmes, Prof. Silvanus Thompson, F.R.S., and Prof. R. Meldola, F.R.S., and a vote of condolence with Mrs. Ward and family was passed.

Mr. Massee delivered a most interesting address on the "Œcology of Fungi," dealing with some of the most recent advances in this fascinating subject. It is impossible to give even the heads of his remarks. The President proposed a

very cordial vote of thanks to the lecturer, which was heartily supported by Dr. Robert Jones and others.

The new species obtained will be incorporated in the list now being prepared, as mentioned above.

Great regret was expressed at the absence of Dr. Cooke, who though happily quite well, felt himself unable to bear the fatigue of a whole-day meeting.

THE 250th ORDINARY MEETING.

SATURDAY, OCTOBER 27TH, 1906.

This meeting took place at the Technical Institute, Stratford, as usual, at 6.30 p.m., Mr. Miller Christy, F.L.S., *President*, in the chair.

New Members.—The following were elected members of the Club :—
Mrs. M. B. Edwards, "*Graham House*," *Cephas Street, Mile End.*
Mr. C. F. Fitch, "*Elmhurst*," *Romford.*
Mr. J. H. Knight, *Loughton Lodge, York Hill, Loughton.*
Mr. Percy Miller, *Traps Hill, Loughton.*
Mr. and Mrs. Octavius F. Peall, "*Elmfield*," 143, *Upper Clapton Road.*
Mr. H. Wilmer, C.E., *St. Albans Crescent, Woodford Green.*
Mr. Walter Young, "*Manor House*," *Squirrels Heath, near Romford.*

The President made some remarks upon methods of procedure at meetings of the Club. He thought that it would be well if new members, present for the first time, were introduced to the President and Officers. As the Club was hoping to increase its membership, this little innovation would be very pleasing, and would doubtless be welcomed by new members. He thought also that care should be taken to write down the names of Visitors, together with those members introducing them. This was the custom with most societies. A book was provided for this purpose.

Donations to the Library.—Mr. T. W. Reader reported on the additions recently made to the library. A very large number of the Transactions of local societies had been received in "exchange." The list of Corresponding Societies was now nearly completed, and their publications collated and arranged. The Royal Society had presented very many parts of their *Proceedings*, so as to render the Club's set almost perfect, and had also presented Dr. Lendenfeld's *Monograph of the Horny Sponges*. Mr. Reader said that the problem of properly binding up the great number of books in the library was becoming a "burning question"—there were probably over 1,000 volumes awaiting binding.

Yellow-necked Mouse.—The Secretary exhibited three specimens of *Mus sylvaticus-wintoni* from Stanway, Essex, presented by Dr. Henry Laver, F.L.S. Mr. Cole remarked that this species was apparently not uncommon in Essex, although it had been so long overlooked. He was very much indebted to Dr. Laver for his continued kindness in procuring interesting specimens for the Museum.

Great Grey Shrike.—Mr. Cole also exhibited two specimens of *Lanius excubitor* from Colchester, which had recently been purchased for the Museum from Mr. Ambrose.

Razor-blade in a Tree.—Also on behalf of Mr. P. Gearing, a curious specimen showing a razor-blade deeply imbedded in the branch of a hornbeam; the wood had grown around the blade and covered it in. It was from Epping Forest.

Portrait of Dr. H. C. Sorby.—Dr. Sorby presented a photogravure portrait of himself, from the oil painting by Mrs. M. L. Waller, paid for by public subscriptions and placed in the Sheffield University, of which institution Dr. Sorby was one of the Founders.

Lower Jurassic Fossils from Finchingfield.—Mr. Percy Thompson exhibited and presented to the Museum a few specimens of Lower Jurassic fossils extracted from a small boulder from mid-glacial gravel, near Finchingfield, on the occasion of the Club's visit on July 28th last.

Fasciated Branch of Holly.—Mr. Thompson also exhibited a fasciated branch of Holly, found on a bush near the "Robin Hood," Epping Forest. Mr. Cole remarked that this kind of growth was not very uncommon in the forest. There was a specimen in the Forest Museum.

Thanks were voted to donors and exhibitors of specimens.

Paper Read.—The Secretary read on behalf of the author, a paper entitled "On the Salinity of the Sea-water along the Coast of Essex," by Dr. H. C. Sorby, F.R.S. (printed *ante*, pp. 235-36.)

Considerable discussion took place on the paper, carried on by the President, Mr. John Spiller, F.I.C., F.C.S., Mr. W. Cole and others, and a vote of thanks was accorded to Dr. Sorby.

Lecture.—Mr. Yeatman Woolf then gave a lecture on "Sponges: Their Life History and Development." The lecture was illustrated by a large number of slides, shown by the electric lantern, and by a series of specimens from Mr. Woolf's own collection.

A discussion on points raised by the lecture was carried on by the President, Mr. Scourfield, Mr. Crouch, the Lecturer and others, and a cordial vote of thanks was given to Mr. Woolf.

The 251st ORDINARY MEETING.

SATURDAY, NOVEMBER 24TH, 1906.

The meeting was held as usual at the Technical Institute, Stratford, at 6.30 p.m., Mr. Miller Christy, F.L.S., President, in the chair.

New Members.—The following were elected:—

Mrs. A. F. Hogg, 81, *Claremont Road, Forest Gate.*

Mr. A. Clifton Kelway, *Corringham Rectory, Stanford-le-Hope.*

Mr. Herbert Playne, M.A., *Head Master, Bancroft School, Woodford.*

Miss F. A. Randell, 33, *Bulwer Road, Leytonstone.*

Recruiting Members.—The President alluded to a project which had been under consideration by the Council for some time. An abstract of the work of the Club, and what it wished to do, had been prepared in pamphlet form (and christened the "Red-book"), and an introductory letter had been signed by members of the Council to accompany the pamphlet. Yesterday (Friday, November 23rd), a first dispatch of 450 of these communications had been

posted to prominent inhabitants of Essex, asking them to join the Club as an encouragement of the work proposed to be carried on. The President had some hope that this action would result in an important addition to the list of members.

Pelvis of Mammoth.—Mr. W. Cole exhibited a portion of the pelvis of a species of *Elephas*, probably *E. primigenius*, which had been dug up in the "Kennedy Estate" on the outskirts of Barking (details of this specimen will be given in a "Museum Note" in the ESSEX NATURALIST).

Considerable discussion took place on this exhibit. Mr. Walter Crouch, F.L.S., who had visited the spot where the bone was found, gave some topographical details. Mr. E. T. Newton, F.R.S., said that it was impossible practically to decide whether the pelvis had belonged to the true mammoth or to the Southern straight-tusked elephant (*Elephas antiquus*). The probabilities were in favour of the bone being from a mammoth. Mr. Newton congratulated Mr. Whitehead, the assistant in the Museum, on the way in which the bone had been put together and imbedded in a slab for preservation.

Serotine Bat in Essex.—The Rev. A. B. Hutton exhibited a specimen of *Vesperugo serotinus*, from Pitsea, Essex. He had previously secured another. Mr. Miller Christy had previously recorded two specimens from Essex[1] (one of which was in the Club's collection), so that in all four Essex Serotines were known.

Rose-coloured Pastor in Essex.—Mr. Hutton also exhibited a specimen of the very rare bird, *Pastor roseus*, taken at Pitsea this autumn. Very few specimens were known from the county, not more than three or four at the most (see Christy's *Birds of Essex*, page 130).

[The bird was first noticed as a British "visitor" by George Edwards (the Stratford Naturalist whose portrait is in E.N., vol. xiii., plate 13) who, in 1742 figured a specimen killed at Norwood, and which was then preserved in a coffee-house at Chelsea.—ED.]

Mr. Hutton also exhibited a female Hobby, but this was from the Kentish shore of the Thames.

Mr. Christy made some remarks upon these very interesting specimens.

Worked Flints from Thundersley.—Mr. F. T. Mapey exhibited some worked flint "flakes" found in his garden near Thundersley Lodge, Essex. Mr. Francis W. Reader remarked that these specimens indicated the existence of flint-working in Neolithic times on the spot, and he recommended Mr. Mapey to keep a look-out for other specimens.

Reputed Meteorite.—Mr. Miller Christy exhibited the reputed meteorite reported in the newspapers as having fallen at Braintree on October 9th. On examination by Dr. Fletcher, of the British Museum, the supposed meteorite was found to be a mass of smelted iron, so that the mystery of the reported "fall" remained unexplained.

In connection with this subject Mr. F. W. Rudler, F.G.S., gave some very interesting details of the fall of the largest meteorite in this country, which happened near Wold Cottage, Thwing, a few miles from Scarborough,

1 PROC.: ESSEX FIELD CLUB, vol. iv., p. iv., and Laver, *The Mammals, &c., of Essex*, page 33.

Yorkshire. To commemorate this fall an obelisk was put up on the spot, with the following inscription :—

"Here, on this spot, December 13th, 1795, fell from the atmosphere an extraordinary stone, in breadth 28 inches, in length 30 inches, and whose weight was 56 pounds. This column in memory of it was erected by Edward Topham, 1799."[1]

Plusia Moneta in Essex.—Mr. W. Cole exhibited a series of this beautiful moth from his garden at Buckhurst Hill. The moth first appeared in England in 1890, and it was one of the most remarkable instances of a species spreading across Europe on a southern migration. In about 50 years it has spread from Russia across Central Europe to Holland, and then to England. It bids fair to become common in south-eastern Britain.

Neolith from Pleshey.—Mr. Miller Christy exhibited, on behalf of Alderman R. W. Christy, an exceptionally fine polished Neolithic Celt, found by a shepherd boy at Pleshey. This implement will be described and figured in the next part of the ESSEX NATURALIST.

Fire-steel.—Mr. Mothersole sent up for exhibition a "steel" of the "flint and steel" period, of unusual shape, and noteworthy in the peculiar way in which it had been worn from use. Mr. Christy made some remarks on this specimen.

Wooden "Smoother."—Mr. Mothersole also sent a curious wooden object, concerning the nature and use of which some discussion arose. Mr. Walter Crouch suggested that it was an implement formerly used in smoothing down the flanges of lead in the old-fashioned leaden window-casements after insertion of the quarries of glass. Mr. Hogg thought that it was either Scottish or Scandinavian in origin, and that it was used by glovers and other leather-workers for smoothing down the joints of the leathers after they had been sown together. He put the date at the end of the 17th or beginning of the 18th century.

Human Skin on Church Door,—Mr. Guy Maynard exhibited a portion of human skin taken from the door of Hadstock Church in 1791, and made some remarks thereon.[2]

Object of Sandstone.—Mr. Guy Maynard also exhibited a curiously grooved object of sandstone found with an urn, apparently of the Bronze Age, at Wendon, Essex, the purpose and use of which was very obscure. Several suggestions were made, but none seemed in any way satisfactory. The specimen is in the Saffron Walden Museum.

Paper Read.—Mr. F. W. Rudler, F.G.S., read his report as delegate at the meeting of the British, at York, (*ante*, p. 237-8).

A vote of thanks was passed to Mr. Rudler for his services in representing the Club at the Conference and for his report. The meeting then closed.

1 This meteorite is in the collection of the British Museum, No. 179 (Pane 4b. of Case). —ED.

2 A paper by the late Mr. G. N. Maynard giving some very curious details of this gruesome subject will be found in the ESSEX NATURALIST, Vol. III., pp. 292-95, under the title of "Human Skin Nailed upon Church Doors at Hadstock, Copford, and elsewhere." See also ESSEX NATURALIST, Vol. II., p. 124.—ED.

ON SOME GEOLOGICAL SECTIONS AT WITHAM, ESSEX.

By J. FRENCH.

IN making the new railway station at Witham some Glacial beds have been exposed, which possess rather more than ordinary interest, as I shall endeavour to show.

The first section to which I would direct attention is that made on the west side of the cutting by the cross-over bridge at the station. This section, which I roughly estimate at 18 feet, shows at the basement about 3 feet of Westleton Sand and Gravel, succeeded by about 13 feet of Glacial-gravel, and this is overlaid by about 2 feet of Boulder-clay remainæ and surface soil. The quality of the members is very pronounced. The Westleton-sand is unmistakeable. The Middle-glacial Gravel is also a typical specimen and the Boulder-clay remainæ, although its calcareous elements have been extracted, is also an unmistakeable element. In a long search for a section showing these three members in juxtaposition I have hitherto been unsuccessful. When the railway was made from Witham to Braintree in 1849, Professor Prestwich saw and figured such an exposure[1], but all his exposures have long since been covered up. His section compares very well with the one above described. In both the Boulder-clay is indented into the Glacial-gravel, whilst the Glacial-gravel below is very much mixed up with the Westleton-bed. The exact line of demarcation cannot be made out. Beyond a certain place we can safely assign all to the "Middle-glacial," and below another certain place we can assign all to the "Westleton."

The other exposure is on the east side of the railway cutting opposite to the other. It is interesting as showing a rather considerable quantity of Post-glacial Gravel resting on Middle-glacial Gravel, and with no trace of intervening Boulder-clay. There is a very large funnel-shaped depression in the lower member, say, 20 feet wide by 15 feet deep, filled with the Post-glacial Gravel and loose earth. This shades off on either side into a uniform covering of about three feet of the same material which, so far as it is exposed, shows minor kind of "pot-holes" at intervals. This points to a denudation of the Boulder-clay, probably of the River-drift period. I find by reference to the

1 "On the relation of the Westleton-Beds, etc." *Quar. Journ. Geol. Soc.*, February, 1908.

Geological Survey Memoir[1] that this Post-deposit continues to be developed both east and west of the above sections, and a figure there shown represents it as deeply indented into the underlying bed. I may mention that the Boulder-clay is well developed on the Braintree line at about a quarter of a mile from the Witham sections, and still further on it is found resting on Westleton-gravel and sand.

NOTES—ORIGINAL AND SELECTED.

BIRDS.

Brambling in Essex.—This bird (*Fringilla montifringilla*) is commonly esteemed a very irregular visitor, but is often seen in winter in Epping Forest. On March 28th, 1906, Mr. Robert Eve, of Maldon, sent two specimens to the museum, with a note calling attention to the very unusual numbers of the bird then in various parts of the county. Mr. Eve continued, "the two specimens I send were killed yesterday at Witham out of a flock of fully fifty birds. Besides the great numbers of these somewhat uncommon birds, it is very curious that they should be staying with us so late."

FISHES.

The Fishes of the Thames in 1746.—I have lately come across a curious and interesting old book, by one Roger Griffith, "Water-bailiff" to the Lord Mayor of London, which was published in 1746 with the object of proving that the Conservancy of the Thames is in the hands of the Corporation of the City of London.[2] With the greater part of the arguments advanced by the author the members of the Essex Field Club have no concern, but his remarks on the various kinds of fish met with in the river in his day are, I think, worth reprinting. Discussing the river, he exclaims:

> How remarkably good is its salmon! What fine large flounders, smelts, shads, trout, graylin, perch, carp, barbell, chub, roach, dace, gudgeon, pike, and other fish, as eels, lamprey, bleak, ruffe are caught above London Bridge; and many other kinds of salt-water fish, as bass, mullet, turbots, soles, maids, place, dabs, skates, thornbacks, halybuts, pearl, whiting, haddock, &c.,

1 "*The Geology of the N.W. part of Essex, etc.*, being explanation of Sheet 47 (one-inch) map of the Geological Survey.

2 *An Essay to prove that the Jurisdiction and Conservancy of the River Thames is committed to the Lord Mayor and City of London* (London, 8o., 1746). The passage quoted occurs on p. 21.

with several sorts of shell-fish, as oysters, mussels, cockles, buntins, crabs, prawns, red and white shrimps, craw-fish, &c., are there to be caught below bridge in the river of Thames.

To-day, of course, Thames salmon and oysters have long been, to a large extent, things of the past.—W. W. GLENNY, *Barking*.

BOTANY.

Ricciella fluitans in Epping Forest.—This interesting little Liverwort was growing luxuriantly last autumn in one of the ponds on Golding's Hill, Epping Forest. The fronds are dichotomous, narrow, strap-shaped, and from half to two inches in length. The allies of this genus are usually found on damp soil or stones, though some species are able to withstand drought. The terrestrial species have numerous air spaces on the upper surface of the fronds, and bear root-hairs and thin green scales on the lower surface. *Ricciella fluitans* is usually submerged in water, though some individuals are to be found growing on the mud around the margin of the pond. The air spaces are completely roofed over in the aquatic form, but in the case of plants growing on land, the air spaces are not completely closed and communicate with the external atmosphere by means of a small pore. There are no root hairs, and only very small scales in the aquatic forms, but these structures are developed considerably when the plants are transferred to a solid substratum. The fronds also become broader and shorter. The floating plants are sterile.

I am indebted to Mr. W. H. Pearson for confirming the name of the species.—HENRY WHITEHEAD, *Essex Museum of Natural History*.

Birch-tree Disease.—The disease, which destroyed so many birch-trees, and was so prevalent during the years 1899-1902, has almost entirely disappeared in the forest area. One now very rarely meets with a dead birch. The decline was almost as sudden as the outbreak, for although during the last three years some few trees were attacked, the injury done was not great and the trees slowly recovered.

As far as I have been able to observe these remarks apply equally to the other localities mentioned in the report in the disease affecting the birch trees in Epping Forest and elsewhere (ESSEX NATURALIST XI., 273).—ROBERT PAULSON.

Hops in Essex.—Mr. J. Holden MacMichael contributed the following extracts from *The St. James's Evening Post* of September 26, 1738, to a recent number of *Notes and Queries* :—

This is to give Notice,

As there is a Fair annually kept at Halstead in Essex, on the 18th Day of October, and the principal part of the Hops in Essex growing in and near the said Place, it is thought Convenient by the Planters and Dealers in Hops, that the same should be used as an Hop-Fair : This is therefore to acquaint the Publick, that for the future it will be kept as an Hop-Fair ; and to encourage the Planters, the Lord of the Manor has consented that Groundage shall be gratis the first Year ; and as the Town is now clear from the Small-Pox, it is hoped that there will be a considerable many Chapmen.

N.B. Also Butter and Cheese.

It seems worth while to place this on permanent local record in these pages.

Possibly some of our members may meet with further references to hop-growing in the county—another lost industry of Essex.—I. CHALKLEY GOULD, Loughton, October 5th, 1906.

INSECTS.

The Felted Beech Coccus (Cryptococcus fagi) in Epping Forest.—Evidence of the presence of this insect pest on some of the beech trees near the "Wake Arms," Epping Forest, was noted during the present summer (1906). The bark of the infected trees has a felted white substance on it, which, if seen during the winter, might be mistaken for snow. An examination of a small flake under the microscope shows it to consist of filaments of a waxy substance, in which may be found yellowish hemispherical masses about one twenty-fifth of an inch in diameter. These are the bodies of adult females of the Beech Coccus—a member of the family of Scale-insects (Coccidæ). The female surrounds herself with filaments of waxy material, which serve as a protective covering. The insect obtains food by sucking juices from the tree through a long tube. The males have not yet been discovered—the mode of reproduction being parthenogenetic. The adult insect is incapable of locomotion, possessing neither legs nor wings, but the tiny larvæ, which are furnished with three pairs of legs, are very active. They crawl over the tree trunk, usually settling down near the bodies of their parents, and adding to the mass of secretion. They are sometimes blown away by the wind or

carried by insects and birds, finally alighting on other beech trees, where they re-commence their work of destruction.

These insects do much damage in some districts. Some of the beech trees on Wimbledon Common had their stems thickly covered with the secretion last autumn. It is probable that the wounds made in the bark enable the spores of fungi and bacteria to enter the delicate tissues of the plant.

A good account of the life-history of this insect is given in leaflet 140 of the Board of Agriculture and Fisheries.—HENRY WHITEHEAD, *The Essex Museum of Natural History*.

MISCELLANEA.

Pottery Mounds in India.—Having lately read Mr. W. Cole's interesting article in the ESSEX NATURALIST on the "Exploration of some Red-Hills in Essex" (*ante* pp. 170-183), and having also visited some of them situated near Salcot, the following remarks as regards somewhat similar mounds which I have seen in India may be of interest, and perhaps tend to elucidate their origin.

Readers are doubtless aware that in the plains and villages of India, where all the water required for domestic use has often to be carried for considerable distances from the wells, a large number of earthen pots or "gurraks" are always required, so that the village potters are most important members of the community, and as many breakages of course take place, they are always kept busy.

Whilst serving in Rajputana and the Punjaub I often had occasion to encamp near or pass through these villages, and I well remember having noticed the potters at work amongst the numerous mounds of red earth found in the neighbourhood. As far as I recollect, the method of burning the pots was to place them in a rough kind of kiln, and simply to heap up cakes of cow-dung or other fuel round about them, and then to fire the heaps. This procedure supplied sufficiently well-burnt vessels, but naturally a great many got broken, and their *debris* formed considerable mounds in the vicinity of the villages, which I think sometimes reached 10 or 15 feet in height.

On seeing the "Red-hill" mounds of Salcot I was naturally much struck by their general resemblance to those so common about the villages of Rajputana and the Punjaub, and I venture

to suggest that possibly these observations may tend to strengthen the idea that probably the red-hills of Essex may have been formed in somewhat the same manner.—E. McARTHUR MOIR (*Indian Forest Service*), *Deoban, Colchester*, October 22nd, 1906.

Making of Marine Salt in China.—The following extracts from Macartney's *Embassy to China* (London, 1797) may be interesting in connection with Mr. Christy's paper (*ante* p. 193), and possibly also with reference to the problem of the Red-hills (*ante* pp. 180-2). Writing of the progress of the Embassy along the Pei-ho, and of the character of the villages on the banks of the river, the narrative continues (Vol. II., pp. 177-182):

"Near some of the towns and villages were pyramids about 15 feet high, but of different dimensions as to length and thickness. They consisted of bags of salt heaped together in that form as peat is preserved in some parts of Europe, These bags were covered merely with common matting; which was, however, found sufficient shelter against the dissolution of the contents by rain. The showers which fell in this part of the country were indeed slight, and seldom happened. . . . . The opposite bank of the river for a considerable way was crowded with pyramids or stacks of salt of the height of those already mentioned. The quantity of that article necessary to fill such heaps appeared to be so enormous that Mr. Barrow was induced to ascertain it by some sort of calculation. 'The number of entire stacks was 222, besides several others that were incomplete. A transverse section of each stack was found to contain seventy bags. None of these stacks were less in length than 200ft. Some extended to 600. Supposing the mean or average length of these stacks to be 400 feet, of which each bag occupied a space of two feet, there would then be, in each stack, 200 sections, or 14,000 bags, and in the 222 stacks, upwards of 3,000,000 bags of salt. Every bag contained about 200 lbs. of salt, and consequently, altogether six hundred million of pounds weight of that article.' . . . . . Most of the marine salt imported into the Pei-ho is brought from the sea-coasts of the two southern provinces of Fo-chien and Quantung, where it is prepared from sea-water. Large fields being made perfectly smooth and flat, with margins elevated about six inches, sea-water is let in upon a clayey surface, either through sluices, or pumped up at high water by chain-pumps. The water is suffered to lie on these fields to a depth of two or three inches. The heat of the sun in the summer season is sufficiently strong to evaporate the water. The evaporation, carried on slowly and uniformly, leaves behind large cubic crystals, and forms that species usually known by the name of Bay-salt in England. There are similar works near the mouth of the Pei-ho river, but to no considerable extent. Its more northern situation is certainly not so favourable for the process by solar heat. Artificial heat is found necessary to complete the process in England, and even in some of the southern parts of France. The salt brought from Quantung and Fo-chien into the Pei-ho is sufficient to load annually nearly two thousand vessels of 200 tons burden each."

The Earl of Macartney's account gives a vivid idea of the

quantities of salt required for domestic use before the employment of it in manufactures, and may serve to show that in England the making of salt from sea-water must have been a great industry prior to the discovery of rock-salt.—ED.

Water Power from the Thames.—"Mr. T. B. Stoney, M.Inst.C.E.I. (Raphoe, co. Donegal), in an interesting letter on the question of power for the metropolis, draws attention again to the water power in the estuary of the Thames, which could probably, he states, be made available in large quantities for industrial purposes by simple and inexpensive works. He instances those reaches of the river in which there is a mean tidal rise of 16½ feet. In the Essex marshes bordering the Thames, he remarks that there are extensive tracts of land at a level of several feet below high water mark. In these marsh basins reservoirs could be constructed, which would be filled by the tide every twelve hours to a depth of (say) five feet at mean high water. When the tide falls, he proceeds, the outflow from these reservoirs into the sea could be used to drive pumps, which would raise water out of the reservoirs to a height of 6 feet above mean high water to feed turbines. These turbines, fixed at low water, would be driven under an average head of 16½ feet. When the tide rises within 4 feet of high water, the discharge of the turbines into the sea would be stopped and diverted into the now empty reservoirs. By this arrangement, our correspondent concludes, the turbines would produce energy for commercial use for 24 hours continuously."—*The Times*, Feb. 14, 1906, *Engineering Supplement*.

[*End of Volume XIV.*]

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